CLAIMS

1. Process for producing tires, comprising the following steps:

(i) in at least one assembly line (100), producing in sequence, incomplete green tire structures (13, 13a, 13b) having a substantially toroidal shape, the production of each incomplete structure (13, 13a, 13b) comprising:

(i-a) building a carcass structure (3) in the form of a substantially cylindrical sleeve comprising at least one carcass ply (10) operationally associated with annular reinforcing structures (7) which are axially spaced from each other;

(i-b) shaping the carcass structure (3) so as to have a substantially toroidal shape;

(ii) temporarily storing the incomplete structures (13, 13a, 13b) produced by said at least one assembly line (100);

(iii) transferring the incomplete structures (13, 13a, 13b) to at least one completion station (200);

(iv) in said at least one completion station (200), forming on each incomplete structure (13, 13a, 13b) at least one constituent element of the tire laying down at least one continuous long element of crude elastomer material along a predetermined path;

(v) subjecting the green tires (13c) thus produced to a vulcanization step.

2. Process as claimed in claim 1, wherein at least two incomplete structures (13, 13a, 13b) are processed simultaneously in a same completion station (200).

3. Process as claimed in claim 1 or 2, wherein at least two incomplete structures (13, 13a, 13b) are subjected simultaneously to the step (iv) involving the formation of at least one constituent element of the

tire in the same completion station (200).

4. Process as claimed in any one of the preceding claims wherein the step (i) also comprises the steps of:

(i-c) manufacturing a belt structure (4);

(i-d) associating said belt structure (4) with said carcass structure (3).

5. Process as claimed in claim 4, wherein the step (i-d) of associating said belt structure (4) with said carcass structure (3) is performed before the step (i-b) of shaping the carcass structure (3) with a substantially toroidal shape.

6. Process as claimed in claim 4, wherein the step (i-d) of associating said belt structure (4) with said carcass structure (3) is performed after the step (i-b) of shaping the carcass structure (3) with a substantially toroidal shape.

7. Process as claimed in claim 4, wherein the step (i-d) of associating said belt structure (4) with said carcass structure (3) is performed at the same time as the step (i-b) of shaping the carcass structure (3) with a substantially toroidal shape.

8. Process as claimed in any one of the preceding claims, wherein the building step (i-a) is performed on a building drum (14) and the shaping step (i-b) is performed on a shaping drum (15).

9. Process as claimed in any one of claims 1 to 7, wherein the building step (i-a) and the shaping step (i-b) are both performed on the same building and shaping drum.

10. Process as claimed in any one of the preceding claims, wherein the temporary storage step (ii) is performed in a storage station (300).

11. Process as claimed in claim 8 or 9, wherein, before the temporary storage step (ii), the incomplete

structures (13, 13a, 13b) are disengaged from the shaping or building and shaping drum (15).

12. Process as claimed in any one of the preceding claims, wherein, during the deposition formation step (iv), each incomplete structure (13, 13a, 13b) is supported on a respective support member (15a, 15b).

13. Process as claimed in claim 12, wherein the support member (15a, 15b) is the shaping or building and shaping drum (15).

14. Process as claimed in any one of the preceding claims, wherein the formation step (iv) is performed laying down the long element in circumferential turns around an axis of said incomplete structure (13, 13a, 13b).

15. Process as claimed in claim 14, wherein said turns are partially superimposed.

16. Process as claimed in any one of the preceding claims, wherein said constituent element of the tire (2) is chosen from among: tread band, tread band underlayer, sidewalls and anti-abrasive strip.

17. Process as claimed in claim 16, wherein the tread band and sidewalls are formed in accordance with step (iv) on each incomplete structure (13, 13a, 13b).

18. Process as claimed in claim 16, wherein the tread band, the tread band underlayer and the sidewalls are formed in accordance with step (iv) on each incomplete structure (13, 13a, 13b).

19. Process as claimed in any one of the preceding claims, wherein each incomplete structure (13, 13a, 13b) is moved inside the completion station with a rotational movement about at least one axis of the incomplete structure (13, 13a, 13b) and a translatory movement with respect to at least one supplying member (19a, 19b, 19c) of the continuous long

element.

20. Process as claimed in any one of the preceding claims, wherein the green tires produced in accordance with step (iv) are disengaged from the support member (15a, 15b) and temporarily stored before being conveyed to the vulcanization step (v).

21. Process as claimed in any one of the preceding steps, wherein the incomplete structures (13, 13a, 13b) supplied from an assembly line (100) are transferred to at least two completion stations (200).

22. Process as claimed in any one of claims 1 to 20, wherein batches of incomplete structures (13, 13a, 13b) supplied from at least two assembly lines (100) are transferred to a completion station (200).

23. Plant for producing tires, comprising:

at least one assembly line (100) for the production of incomplete green tire structures (13, 13a, 13b) having a substantially toroidal shape, which comprises: at least one apparatus for building carcass structures (3) in the form of a substantially cylindrical sleeve; and at least one apparatus for shaping said carcass structures (3) so as to have a substantially toroidal shape; said carcass structures (3) comprising at least one carcass ply (10) operationally associated with annular reinforcing structures (7) axially spaced from each other;

at least one storage station (300) for temporarily storing the incomplete structures (13, 13a, 13b) produced by said at least one assembly line (100);

at least one completion station (200) comprising: at least one member (19a, 19b, 19c) for supplying a continuous long element of crude elastomer material; and at least two units (20a, 20b) for handling the incomplete structures (13, 13a, 13b) supplied by said assembly line (100), said handling units (20a, 20b)

being able to impart, to said incomplete structures (13, 13a, 13b), a rotational movement about at least one axis of the incomplete structure (13, 13a, 13b) and a translatory movement with respect to said at least one supplying member (19a, 19b, 19c), so as to form on said incomplete structures (13, 13a, 13b) at least one constituent element of the tire laying down said continuous long element along a predetermined path.

24. Plant as claimed in claim 23, wherein said apparatus for building carcass structures (3) is a building drum (14).

25. Plant as claimed in claim 23, wherein said apparatus for shaping said carcass structure (3) with a substantially toroidal shape is a shaping drum (15).

26. Plant as claimed in claim 23, wherein said apparatus for building said carcass structure (3) and said apparatus for shaping said carcass structure (3) are incorporated in a unistage drum.

27. Plant as claimed in any one of claims 23 to 26, wherein said assembly line (100) comprises at least one auxiliary drum (16) for forming a belt structure (4).

28. Plant as claimed in claim 27, wherein said assembly line (100) comprises at least one transfer member (18) for transferring said belt structure (4) into a position radially on the outside of said carcass structure (3).

29. Plant as claimed in any one of claims 23 to 28, also comprising an unloading station (400) for the green tires (13c) produced by said at least one completion station (200).

30. Plant as claimed in any one of claims 23 to 29, wherein at least one completion station (200) comprises at least two supplying members (19a, 19b, 19c).

31. Plant as claimed in claim 30, wherein said at least one completion station (200) comprises three supplying members (19a, 19b, 19c).

32. Plant as claimed in claim 30 or 31, wherein a first supplying member (19a) and a second supplying member (19b) are arranged so that the respective long elements of crude elastomer material are supplied substantially at the same height.

33. Plant as claimed in claim 32, wherein a third supplying member (19c) is arranged so that the respective long element of crude elastomer material is supplied at a height vertically greater than the height of the first supplying member (19a) and second supplying member (19b).

34. Plant as claimed in any one of claims 30 to 33, wherein said at least two supplying members (19a, 19b, 19c) are arranged symmetrically with respect to a same vertical plane of symmetry (α).

35. Plant as claimed in claim 34, wherein said at least two handling units (20a, 20b) are arranged symmetrically with respect to said vertical plane of symmetry (α).

36. Plant as claimed in any one of claims 23 to 35, wherein at least two completion stations (200) are associated with each assembly line (100).

37. Plant as claimed in any one of claims 23 to 35, wherein at least two assembly lines (100) are associated with each completion station (200).

38. Completion station comprising: at least one member (19a, 19b, 19c) for supplying a continuous long element of crude elastomer material; and at least two units (20a, 20b) for handling incomplete structures (13, 13a, 13b) of green tires, said handling units (20a, 20b) being able to impart, to said incomplete structures (13, 13a, 13b), a rotational movement about

at least one axis of the incomplete structure (13, 13a, 13b) and a translatory movement with respect to said at least one supplying member (19a, 19b, 19c) so as to form on said incomplete structures (13, 13a, 13b) at least one constituent element of the tire laying down said continuous long element along a predetermined path.

39. Completion station as claimed in claim 38, comprising at least two supplying members (19a, 19b, 19c).

40. Completion station as claimed in claim 39, comprising three supplying members (19a, 19b, 19c).

41. Completion station as claimed in claim 39 or 40, wherein a first supplying member (19a) and second supplying member (19b) are arranged so that the respective long elements of crude elastomer material are supplied substantially at the same height.

42. Completion station as claimed in claim 41, wherein a third supplying member (19c) is arranged so that the respective long element of crude elastomer material is supplied at a height vertically greater than the height of the first supplying member (19a) and the second supplying member (19b).

43. Completion station as claimed in any one of claims 39 to 42, wherein said at least two supplying members (19a, 19b, 19c) are arranged symmetrically with respect to a same vertical plane of symmetry (α).

44. Completion station as claimed in claim 43, wherein said at least two handling units (20a, 20b) are arranged symmetrically with respect to said vertical plane of symmetry (α).